

Appendix G

Best Fit Data-Calculations of 95% UCL on the
Arithmetic Mean and Hypothesis Testing

Gkhoury

<p>General UCL Statistics for Full Data Sets</p> <p>Arsenic</p> <p>General Statistics</p> <table border="0"> <tr><td>Number of Valid Observations</td><td>84</td><td>Number of Distinct Observations</td></tr> <tr><td>Number of Missing Values</td><td>2</td><td></td></tr> </table> <p>Raw Statistics</p> <table border="0"> <tr><td>Minimum</td><td>0.016</td><td>Log-transformed Statistics</td></tr> <tr><td>Maximum</td><td>10.6</td><td>0.016 Minimum of Log Data</td></tr> <tr><td>Mean</td><td>4.497</td><td>10.6 Maximum of Log Data</td></tr> <tr><td>Median</td><td>4.335</td><td>Mean of log Data</td></tr> <tr><td>SD</td><td>1.446</td><td>4.335 SD of log Data</td></tr> <tr><td>Std. 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These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.</p>	Number of Valid Observations	84	Number of Distinct Observations	Number of Missing Values	2		Minimum	0.016	Log-transformed Statistics	Maximum	10.6	0.016 Minimum of Log Data	Mean	4.497	10.6 Maximum of Log Data	Median	4.335	Mean of log Data	SD	1.446	4.335 SD of log Data	Std. Error of Mean	0.158		Coefficient of Variation	0.322		Skewness	0.816		Normal Distribution Test	Lognormal Distribution Test	Lilliefors Test Statistic	0.087 Lilliefors Test Statistic	Lilliefors Critical Value	0.0967 Lilliefors Critical Value	Data appear Normal at 5% Significance Level	Data not Lognormal at 5% Significance Level	95% Student's-t UCL	4.759	95% H-UCL	95% UCLs (Adjusted for Skewness)	4.771	95% Chebyshev (MVUE) UCL	95% Adjusted-CLT UCL (Chen-1995)	4.761	97.5% Chebyshev (MVUE) UCL	95% Modified-t UCL (Johnson-1978)	5.948	99% Chebyshev (MVUE) UCL	k star (bias corrected)	5.146	Data appear Normal at 5% Significance Level	Theta Star	0.874		MLE of Mean	4.497		MLE of Standard Deviation	1.982		nu star	864.5		Approximate Chi Square Value (.05)	797.3	Nonparametric Statistics	Adjusted Level of Significance	0.0471	95% CLT UCL	Adjusted Chi Square Value	796.1	95% Jackknife UCL			95% Standard Bootstrap UCL	Anderson-Darling Test Statistic	4.024	95% Bootstrap-t UCL	Anderson-Darling 5% Critical Value	0.754	95% Hall's Bootstrap UCL	Kolmogorov-Smirnov Test Statistic	0.158	95% Percentile Bootstrap UCL	Kolmogorov-Smirnov 5% Critical Value	0.0977	95% BCA Bootstrap UCL	Data not Gamma Distributed at 5% Significance Level	5.184	95% Chebyshev(Mean, Sd) UCL		5.482	97.5% Chebyshev(Mean, Sd) UCL		6.066	99% Chebyshev(Mean, Sd) UCL	Assuming Gamma Distribution			95% Approximate Gamma UCL	4.876		95% Adjusted Gamma UCL	4.883		Use 95% Student's-t UCL	4.759	<p>Pb210</p> <p>General Statistics</p> <table border="0"> <tr><td>Number of Valid Observations</td><td>79</td><td>Number of Distinct Observations</td></tr> <tr><td>Number of Missing Values</td><td>4</td><td>4 Number of Distinct Observations</td></tr> </table> <p>Warning: This data set only has 4 observations!</p> <p>Data set is too small to compute reliable and meaningful statistics and estimates!</p> <p>The data set for variable Pb210 was not processed!</p> <p>-4.135</p> <p>2.361 It is suggested to collect at least 8 to 10 observations before using these statistical methods!</p> <p>1.407 If possible, compute and collect Data Quality Objectives (DQOs) based sample size and analytical results.</p> <p>0.677</p> <p>Ba140</p> <p>Lead</p> <p>General Statistics</p> <table border="0"> <tr><td>Number of Valid Observations</td><td>84</td><td>Number of Distinct Observations</td></tr> <tr><td>Number of Missing Values</td><td>2</td><td>86 Number of Distinct Observations</td></tr> </table> <p>Raw Statistics</p> <table border="0"> <tr><td>Minimum</td><td>0.019</td><td>Log-transformed Statistics</td></tr> <tr><td>Maximum</td><td>27.7</td><td>0.019 Minimum of Log Data</td></tr> <tr><td>Mean</td><td>12.75</td><td>27.7 Maximum of Log Data</td></tr> <tr><td>Median</td><td>12.15</td><td>Mean of log Data</td></tr> <tr><td>SD</td><td>5.337</td><td>12.15 SD of log Data</td></tr> <tr><td>Std. Error of Mean</td><td>0.582</td><td></td></tr> <tr><td>Coefficient of Variation</td><td>0.418</td><td></td></tr> <tr><td>Skewness</td><td>0.708</td><td></td></tr> </table> <p>Relevant UCL Statistics</p> <table border="0"> <tr><td>Normal Distribution Test</td><td>Lognormal Distribution Test</td></tr> <tr><td>Lilliefors Test Statistic</td><td>0.112 Lilliefors Test Statistic</td></tr> <tr><td>Lilliefors Critical Value</td><td>0.0967 Lilliefors Critical Value</td></tr> <tr><td>Data not Normal at 5% Significance Level</td><td>Data not Lognormal at 5% Significance Level</td></tr> </table> <p>Assuming Normal Distribution</p> <table border="0"> <tr><td>95% Student's-t UCL</td><td>13.72</td><td>95% H-UCL</td></tr> <tr><td>95% UCLs (Adjusted for Skewness)</td><td>13.76</td><td>95% Chebyshev (MVUE) UCL</td></tr> <tr><td>95% Adjusted-CLT UCL (Chen-1995)</td><td>13.73</td><td>97.5% Chebyshev (MVUE) UCL</td></tr> <tr><td>95% Modified-t UCL (Johnson-1978)</td><td>18.34</td><td>99% Chebyshev (MVUE) UCL</td></tr> </table> <p>Gamma Distribution Test</p> <table border="0"> <tr><td>k star (bias corrected)</td><td>3.595</td><td>Data do not follow a Discernible Distribution (0.05)</td></tr> <tr><td>Theta Star</td><td>3.547</td><td></td></tr> <tr><td>MLE of Mean</td><td>12.75</td><td></td></tr> <tr><td>MLE of Standard Deviation</td><td>6.726</td><td></td></tr> <tr><td>nu star</td><td>604</td><td></td></tr> <tr><td>Approximate Chi Square Value (.05)</td><td>547.9</td><td>Nonparametric Statistics</td></tr> <tr><td>Adjusted Level of Significance</td><td>0.0471</td><td>95% CLT UCL</td></tr> <tr><td>Adjusted Chi Square Value</td><td>547</td><td>95% Jackknife UCL</td></tr> <tr><td></td><td></td><td>95% Standard Bootstrap UCL</td></tr> <tr><td>Anderson-Darling Test Statistic</td><td>1.779</td><td>95% Bootstrap-t UCL</td></tr> <tr><td>Anderson-Darling 5% Critical Value</td><td>0.757</td><td>95% Hall's Bootstrap UCL</td></tr> <tr><td>Kolmogorov-Smirnov Test Statistic</td><td>0.119</td><td>95% Percentile Bootstrap UCL</td></tr> <tr><td>Kolmogorov-Smirnov 5% Critical Value</td><td>0.098</td><td>95% BCA Bootstrap UCL</td></tr> <tr><td>Data not Gamma Distributed at 5% Significance Level</td><td>13.71</td><td>95% Chebyshev(Mean, Sd) UCL</td></tr> <tr><td></td><td>13.71</td><td>97.5% Chebyshev(Mean, Sd) UCL</td></tr> <tr><td></td><td>16.39</td><td>99% Chebyshev(Mean, Sd) UCL</td></tr> <tr><td>Assuming Gamma Distribution</td><td></td><td></td></tr> <tr><td>95% Approximate Gamma UCL</td><td>14.06</td><td></td></tr> <tr><td>95% Adjusted Gamma UCL</td><td>14.08</td><td></td></tr> </table> <p>Potential UCL to Use</p> <table border="0"> <tr><td>Use 95% Chebyshev (Mean, Sd) UCL</td><td>15.29</td></tr> </table> <p>Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.</p>	Number of Valid Observations	79	Number of Distinct Observations	Number of Missing Values	4	4 Number of Distinct Observations	Number of Valid Observations	84	Number of Distinct Observations	Number of Missing Values	2	86 Number of Distinct Observations	Minimum	0.019	Log-transformed Statistics	Maximum	27.7	0.019 Minimum of Log Data	Mean	12.75	27.7 Maximum of Log Data	Median	12.15	Mean of log Data	SD	5.337	12.15 SD of log Data	Std. 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Molybdenum

General Statistics

Number of Valid Observations
Number of Missing Values

84 Number of Distinct Observations
2

Raw Statistics

Minimum
Maximum
Mean
Median
SD
Std. Error of Mean
Coefficient of Variation
Skewness

Log-transformed Statistics
0.023 Minimum of Log Data
1.74 Maximum of Log Data
0.719 Mean of log Data
0.657 SD of log Data
0.288
0.0314
0.401
0.768

Relevant UCL Statistics

Normal Distribution Test
Lilliefors Test Statistic
Lilliefors Critical Value
Data not Normal at 5% Significance Level

Lognormal Distribution Test
0.109 Lilliefors Test Statistic
0.0967 Lilliefors Critical Value
Data not Lognormal at 5% Significance Level

Co60

General Statistics

Number of Valid Observations
Number of Distinct Observations

77

86 Number of Distinct Observations

1

Warning: There is only one distinct observation value in this data set - resulting in '0' variance!
ProUCL (or any other software) should not be used on such a data set!

-3.772 The data set for variable Co60 was not processed!
0.554
-0.428 If possible, compute and collect Data Quality Objectives (DQOs) based sample size and analytical results.
0.523 The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Assuming Normal Distribution

95% Student's-t UCL
95% UCLs (Adjusted for Skewness)
95% Adjusted-CLT UCL (Chen-1995)
95% Modified-t UCL (Johnson-1978)

Assuming Lognormal Distribution
0.771 95% H-UCL
0.95% Chebyshev (MVUE) UCL
0.774 97.5% Chebyshev (MVUE) UCL
0.772 99% Chebyshev (MVUE) UCL

0.832
0.943
1.028
1.196

Gamma Distribution Test

k star (bias corrected)

Data Distribution
5.092 Data appear Gamma Distributed at 5% Significance Level

Theta Star

0.141

MLE of Mean

0.719

MLE of Standard Deviation

0.319

nu star

855.4

Approximate Chi Square Value (.05)

788.5 Nonparametric Statistics

Adjusted Level of Significance

0.0471 95% CLT UCL
787.4 95% Jackknife UCL
95% Standard Bootstrap UCL

0.771
0.771
0.771

Adjusted Chi Square Value

0.656 95% Bootstrap-t UCL
0.754 95% Hall's Bootstrap UCL

0.775
0.773

Anderson-Darling Test Statistic

0.0648 95% Percentile Bootstrap UCL
0.0977 95% BCA Bootstrap UCL

0.773
0.773

Anderson-Darling 5% Critical Value

0.0977 95% Chebyshev(Mean, Sd) UCL

0.773

Kolmogorov-Smirnov Test Statistic

0.0977 95% Chebyshev(Mean, Sd) UCL

0.773

Kolmogorov-Smirnov 5% Critical Value

0.0977 95% Chebyshev(Mean, Sd) UCL

0.773

Data appear Gamma Distributed at 5% Significance Level

95% Chebyshev(Mean, Sd) UCL
97.5% Chebyshev(Mean, Sd) UCL
99% Chebyshev(Mean, Sd) UCL

0.856
0.915
1.032

Assuming Gamma Distribution

95% Approximate Gamma UCL

0.78

95% Adjusted Gamma UCL

0.781

Potential UCL to Use

Use 95% Approximate Gamma UCL
0.78

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Selenium

General Statistics

Number of Valid Observations
Number of Missing Values

46 Number of Distinct Observations
31

45

Raw Statistics

Minimum
Maximum
Mean
Median
SD
Std. Error of Mean
Coefficient of Variation
Skewness

Log-transformed Statistics
0.022 Minimum of Log Data
2.2 Maximum of Log Data
0.615 Mean of log Data
0.531 SD of log Data
0.367
0.0541
0.597
2.299

-3.817
0.788
-0.651
0.66

Relevant UCL Statistics

Normal Distribution Test
Shapiro Wilk Test Statistic
Shapiro Wilk Critical Value
Data not Normal at 5% Significance Level

Lognormal Distribution Test
0.811 Shapiro Wilk Test Statistic
0.945 Shapiro Wilk Critical Value
Data not Lognormal at 5% Significance Level

0.827
0.945

Assuming Normal Distribution

95% Student's-t UCL
95% UCLs (Adjusted for Skewness)
95% Adjusted-CLT UCL (Chen-1995)
95% Modified-t UCL (Johnson-1978)

Assuming Lognormal Distribution
0.706 95% H-UCL
0.706 95% Chebyshev (MVUE) UCL
0.723 97.5% Chebyshev (MVUE) UCL
0.709 99% Chebyshev (MVUE) UCL

0.789
0.941
1.069
1.321

Gamma Distribution Test

k star (bias corrected)

Data Distribution
3.001 Data Follow Appr. Gamma Distribution at 5% Significance Level

Theta Star

0.205

MLE of Mean

0.615

MLE of Standard Deviation

0.355

nu star

276.1

Approximate Chi Square Value (.05)

238.6 Nonparametric Statistics
0.0448 95% CLT UCL
237.5 95% Jackknife UCL
95% Standard Bootstrap UCL

0.704
0.706
0.703

Adjusted Level of Significance

0.0448 95% CLT UCL
237.5 95% Jackknife UCL
95% Standard Bootstrap UCL

0.704
0.706
0.703

Adjusted Chi Square Value

1.031 95% Bootstrap-t UCL
0.755 95% Hall's Bootstrap UCL

0.73
0.772

Anderson-Darling Test Statistic

0.127 95% Percentile Bootstrap UCL
0.131 95% BCA Bootstrap UCL

0.707
0.72

Kolmogorov-Smirnov Test Statistic

0.131 95% Chebyshev(Mean, Sd) UCL

0.851

Kolmogorov-Smirnov 5% Critical Value

0.131 95% Chebyshev(Mean, Sd) UCL
95% Chebyshev(Mean, Sd) UCL

0.953

Data follow Appr. Gamma Distribution at 5% Significance Level

95% Chebyshev(Mean, Sd) UCL
97.5% Chebyshev(Mean, Sd) UCL
99% Chebyshev(Mean, Sd) UCL

0.953
0.953
1.153

Assuming Gamma Distribution

95% Approximate Gamma UCL
95% Adjusted Gamma UCL

0.711
0.715

Potential UCL to Use Use 95% Approximate Gamma UCL 0.711

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Vanadium

General Statistics

Number of Valid Observations	46	Number of Distinct Observations	40
Number of Missing Values	31		

Raw Statistics Log-transformed Statistics

Minimum	0.022	Minimum of Log Data	-3.817
Maximum	38.9	Maximum of Log Data	3.661
Mean	23.95	Mean of log Data	3.011
Median	23.4	SD of log Data	1.064
SD	7.383		
Std. Error of Mean	1.088		
Coefficient of Variation	0.308		
Skewness	-0.338		

Relevant UCL Statistics

Normal Distribution Test	Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.973 Shapiro Wilk Test Statistic	0.365
Shapiro Wilk Critical Value	0.945 Shapiro Wilk Critical Value	0.945
Data appear Normal at 5% Significance Level	Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution Assuming Lognormal Distribution

95% Student's-t UCL	25.78	95% H-UCL	52.26
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	63.65
95% Adjusted-CLT UCL (Chen-1995)	25.68	97.5% Chebyshev (MVUE) UCL	76.01
95% Modified-t UCL (Johnson-1978)	25.77	99% Chebyshev (MVUE) UCL	100.3

Gamma Distribution Test Data Distribution

k star (bias corrected)	2.993	Data appear Normal at 5% Significance Level	
Theta Star	8.002		
MLE of Mean	23.95		
MLE of Standard Deviation	13.84		
nu star	275.4		
Approximate Chi Square Value (.05)	237.9	Nonparametric Statistics	
Adjusted Level of Significance	0.0448	95% CLT UCL	25.74
Adjusted Chi Square Value	236.8	95% Jackknife UCL	25.78
		95% Standard Bootstrap UCL	25.78
Anderson-Darling Test Statistic	4.515	95% Bootstrap-t UCL	25.75
Anderson-Darling 5% Critical Value	0.755	95% Hall's Bootstrap UCL	25.66
Kolmogorov-Smirnov Test Statistic	0.237	95% Percentile Bootstrap UCL	25.7
Kolmogorov-Smirnov 5% Critical Value	0.133	95% BCA Bootstrap UCL	25.64
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	28.7
		97.5% Chebyshev(Mean, Sd) UCL	30.75
		99% Chebyshev(Mean, Sd) UCL	34.78
Assuming Gamma Distribution			
95% Approximate Gamma UCL	27.72		
95% Adjusted Gamma UCL	27.85		

Potential UCL to Use Use 95% Student's-t UCL 25.78

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Note: For highly negative-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

General UCL Statistics for Full Data Sets

Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Alpha

General Statistics

Number of Valid Observations	86	Number of Distinct Observations	55
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Raw Statistics Log-transformed Statistics			
Minimum	0.8	Minimum of Log Data	-0.223
Maximum	26.6	Maximum of Log Data	3.281
Mean	8.047	Mean of log Data	1.98
Median	7.85	SD of log Data	0.488
SD	3.753		
Std. Error of Mean	0.405		
Coefficient of Variation	0.466		
Skewness	1.788		

Relevant UCL Statistics Lognormal Distribution Test

Normal Distribution Test	0.105 Lilliefors Test Statistic	0.102
Lilliefors Test Statistic	0.0955 Lilliefors Critical Value	0.0955
Lilliefors Critical Value		Data not Lognormal at 5% Significance Level
Data not Normal at 5% Significance Level		

Assuming Normal Distribution Assuming Lognormal Distribution

95% Student's-t UCL	8.72	95% H-UCL	8.992
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	10.11
95% Adjusted-CLT UCL (Chen-1995)	8.79	97.5% Chebyshev (MVUE) UCL	10.96
95% Modified-t UCL (Johnson-1978)	8.733	99% Chebyshev (MVUE) UCL	12.63

Gamma Distribution Test Data Distribution

k star (bias corrected)	4.758	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	1.691		
MLE of Mean	8.047		
MLE of Standard Deviation	3.689		
nu star	818.3		
Approximate Chi Square Value (.05)	752.9	Nonparametric Statistics	
Adjusted Level of Significance	0.0472	95% CLT UCL	8.712
Adjusted Chi Square Value	751.9	95% Jackknife UCL	8.72
		95% Standard Bootstrap UCL	8.72

Anderson-Darling Test Statistic	0.653	95% Bootstrap-t UCL	8.831
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Anderson-Darling 5% Critical Value	0.755	95% Hall's Bootstrap UCL	8.892
Kolmogorov-Smirnov Test Statistic	0.0755	95% Percentile Bootstrap UCL	8.733
Kolmogorov-Smirnov 5% Critical Value	0.0967	95% BCA Bootstrap UCL	8.835
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	9.811
		97.5% Chebyshev(Mean, Sd) UCL	10.57
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	12.07
95% Approximate Gamma UCL	8.745		
95% Adjusted Gamma UCL	8.758		
Potential UCL to Use		Use 95% Approximate Gamma UCL	8.745

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Beta

General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	69
Raw Statistics		Log-transformed Statistics	
Minimum	11	Minimum of Log Data	2.398
Maximum	42.7	Maximum of Log Data	3.754
Mean	25.93	Mean of log Data	3.237
Median	25.85	SD of log Data	0.2
SD	4.966		
Std. Error of Mean	0.536		
Coefficient of Variation	0.192		
Skewness	0.268		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.0856	Lilliefors Test Statistic	0.0546
Lilliefors Critical Value	0.0955	Lilliefors Critical Value	0.0955
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	26.82	95% H-UCL	26.94
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	28.42
95% Adjusted-CLT UCL (Chen-1995)	26.83	97.5% Chebyshev (MVUE) UCL	29.48
95% Modified-t UCL (Johnson-1978)	26.83	99% Chebyshev (MVUE) UCL	31.58
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	25.61	Data appear Normal at 5% Significance Level	
Theta Star	1.013		
MLE of Mean	25.93		
MLE of Standard Deviation	5.124		
nu star	4405		
Approximate Chi Square Value (.05)	4252	Nonparametric Statistics	
Adjusted Level of Significance	0.0472	95% CLT UCL	26.81
Adjusted Chi Square Value	4250	95% Jackknife UCL	26.82
		95% Standard Bootstrap UCL	26.8
Anderson-Darling Test Statistic	0.299	95% Bootstrap-t UCL	26.83
Anderson-Darling 5% Critical Value	0.75	95% Hall's Bootstrap UCL	26.8
Kolmogorov-Smirnov Test Statistic	0.0624	95% Percentile Bootstrap UCL	26.79
Kolmogorov-Smirnov 5% Critical Value	0.0961	95% BCA Bootstrap UCL	26.83
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	28.27
		97.5% Chebyshev(Mean, Sd) UCL	29.28
		99% Chebyshev(Mean, Sd) UCL	31.26
Assuming Gamma Distribution			
95% Approximate Gamma UCL	26.87		
95% Adjusted Gamma UCL	26.88		
Potential UCL to Use		Use 95% Student's-t UCL	26.82

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Bi212

General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	56
Raw Statistics		Log-transformed Statistics	
Minimum	0.48	Minimum of Log Data	-0.734
Maximum	1.57	Maximum of Log Data	0.451
Mean	1.017	Mean of log Data	-0.0192
Median	1.045	SD of log Data	0.277
SD	0.263		
Std. Error of Mean	0.0284		
Coefficient of Variation	0.259		
Skewness	-0.0454		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.0912	Lilliefors Test Statistic	0.11
Lilliefors Critical Value	0.0955	Lilliefors Critical Value	0.0955
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1.064	95% H-UCL	1.074
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1.154
95% Adjusted-CLT UCL (Chen-1995)	1.064	97.5% Chebyshev (MVUE) UCL	1.212
95% Modified-t UCL (Johnson-1978)	1.064	99% Chebyshev (MVUE) UCL	1.327
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	13.56	Data appear Normal at 5% Significance Level	
Theta Star	0.075		
MLE of Mean	1.017		
MLE of Standard Deviation	0.276		
nu star	2332		
Approximate Chi Square Value (.05)	2220	Nonparametric Statistics	
Adjusted Level of Significance	0.0472	95% CLT UCL	1.064
Adjusted Chi Square Value	2219	95% Jackknife UCL	1.064
		95% Standard Bootstrap UCL	1.064

Anderson-Darling Test Statistic	0.891	95% Bootstrap-t UCL	1.063
Anderson-Darling 5% Critical Value	0.751	95% Hall's Bootstrap UCL	1.063
Kolmogorov-Smirnov Test Statistic	0.0968	95% Percentile Bootstrap UCL	1.064
Kolmogorov-Smirnov 5% Critical Value	0.0962	95% BCA Bootstrap UCL	1.064
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.141
		97.5% Chebyshev(Mean, Sd) UCL	1.194
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1.3
95% Approximate Gamma UCL	1.068		
95% Adjusted Gamma UCL	1.069		

Potential UCL to Use Use 95% Student's-t UCL 1.064

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Note: For highly negative-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

Bi214

General Statistics			
Number of Valid Observations		86	Number of Distinct Observations
Raw Statistics	Log-transformed Statistics		
Minimum	0.494	Minimum of Log Data	-0.705
Maximum	2.79	Maximum of Log Data	1.026
Mean	1.087	Mean of log Data	0.0334
Median	0.97	SD of log Data	0.313
SD	0.368		
Std. Error of Mean	0.0397		
Coefficient of Variation	0.339		
Skewness	1.509		
Relevant UCL Statistics			
Normal Distribution Test	Lognormal Distribution Test		
Lilliefors Test Statistic	0.162	Lilliefors Test Statistic	0.113
Lilliefors Critical Value	0.0955	Lilliefors Critical Value	0.0955
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution	Assuming Lognormal Distribution		
95% Student's-t UCL	1.153	95% H-UCL	1.153
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1.249
95% Adjusted-CLT UCL (Chen-1995)	1.159	97.5% Chebyshev (MVUE) UCL	1.32
95% Modified-t UCL (Johnson-1978)	1.154	99% Chebyshev (MVUE) UCL	1.459
Gamma Distribution Test	Data Distribution		
k star (bias corrected)	9.791	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.111		
MLE of Mean	1.087		
MLE of Standard Deviation	0.347		
nu star	1.684		
Approximate Chi Square Value (.05)		1.590 Nonparametric Statistics	
Adjusted Level of Significance	0.0472	95% CLT UCL	1.152
Adjusted Chi Square Value	1.588	95% Jackknife UCL	1.153
		95% Standard Bootstrap UCL	1.153
Anderson-Darling Test Statistic	0.942	95% Bootstrap-t UCL	1.163
Anderson-Darling 5% Critical Value	0.751	95% Hall's Bootstrap UCL	1.159
Kolmogorov-Smirnov Test Statistic	0.133	95% Percentile Bootstrap UCL	1.153
Kolmogorov-Smirnov 5% Critical Value	0.0963	95% BCA Bootstrap UCL	1.156
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.26
		97.5% Chebyshev(Mean, Sd) UCL	1.335
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1.482
95% Approximate Gamma UCL	1.152		
95% Adjusted Gamma UCL	1.153		
Potential UCL to Use		Use 95% Student's-t UCL	1.153
		or 95% Modified-t UCL	1.154

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

I131

Cs137			
General Statistics		General Statistics	
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
Relevant UCL Statistics			
Normal Distribution Test	Lognormal Distribution Test		
Lilliefors Test Statistic	0.0517	Lilliefors Test Statistic	0.0841
Lilliefors Critical Value	0.0955	Lilliefors Critical Value	0.0955
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution	Assuming Lognormal Distribution		
95% Student's-t UCL	0.0668	95% H-UCL	0.0691
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.0766
95% Adjusted-CLT UCL (Chen-1995)	0.0668	97.5% Chebyshev (MVUE) UCL	0.0823
95% Modified-t UCL (Johnson-1978)	0.0668	99% Chebyshev (MVUE) UCL	0.0933
Gamma Distribution Test	Data Distribution		
k star (bias corrected)	6.657	Data appear Normal at 5% Significance Level	
Theta Star	0.00943		
MLE of Mean	0.0628		
General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
I131			
General Statistics		General Statistics	
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	
SD	0.0223		
Std. Error of Mean	0.0024		
Coefficient of Variation	0.354		
Skewness	0.253		
General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	1
Raw Statistics	Log-transformed Statistics		
Minimum	0.0113	Minimum of Log Data	
Maximum	0.123	Maximum of Log Data	
Mean	0.0628	Mean of log Data	
Median	0.061	SD of log Data	</

MLE of Standard Deviation	0.0243
nu star	1145
Approximate Chi Square Value (.05)	1067 Nonparametric Statistics
Adjusted Level of Significance	0.0472 95% CLT UCL
Adjusted Chi Square Value	1066 95% Jackknife UCL 95% Standard Bootstrap UCL
Anderson-Darling Test Statistic	0.406 95% Bootstrap-t UCL
Anderson-Darling 5% Critical Value	0.753 95% Hall's Bootstrap UCL
Kolmogorov-Smirnov Test Statistic	0.0555 95% Percentile Bootstrap UCL
Kolmogorov-Smirnov 5% Critical Value	0.0965 95% BCA Bootstrap UCL 95% Chebychev(Mean, Sd) UCL
Data appear Gamma Distributed at 5% Significance Level	97.5% Chebychev(Mean, Sd) UCL 95% Chebychev(Mean, Sd) UCL
Assuming Gamma Distribution	99% Chebychev(Mean, Sd) UCL
95% Approximate Gamma UCL	0.0674
95% Adjusted Gamma UCL	0.0675

Potential UCL to Use Use 95% Student's-t UCL 0.0668

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

K40

General Statistics		
Number of Valid Observations	86 Number of Distinct Observations	49
Raw Statistics	Log-transformed Statistics	
Minimum	12.7 Minimum of Log Data	2.542
Maximum	20.7 Maximum of Log Data	3.03
Mean	16.48 Mean of log Data	2.797
Median	16.75 SD of log Data	0.105
SD	1.702	
Std. Error of Mean	0.184	
Coefficient of Variation	0.103	
Skewness	-0.151	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Lilliefors Test Statistic	0.0854 Lilliefors Test Statistic	0.104
Lilliefors Critical Value	0.0955 Lilliefors Critical Value	0.0955
Data appear Normal at 5% Significance Level	Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	16.79 95% H-UCL	16.8
95% UCLs (Adjusted for Skewness)	95% Chebychev (MVUE) UCL	17.3
95% Adjusted-CLT UCL (Chen-1995)	16.78 97.5% Chebychev (MVUE) UCL	17.66
95% Modified-t UCL (Johnson-1978)	16.79 99% Chebychev (MVUE) UCL	18.35

Gamma Distribution Test	Data Distribution
k star (bias corrected)	89.6 Data appear Normal at 5% Significance Level
Theta Star	0.184
MLE of Mean	16.48
MLE of Standard Deviation	1.741
nu star	15411
Approximate Chi Square Value (.05)	15123 Nonparametric Statistics
Adjusted Level of Significance	0.0472 95% CLT UCL
Adjusted Chi Square Value	15118 95% Jackknife UCL 95% Standard Bootstrap UCL
Anderson-Darling Test Statistic	0.634 95% Bootstrap-t UCL
Anderson-Darling 5% Critical Value	0.75 95% Hall's Bootstrap UCL
Kolmogorov-Smirnov Test Statistic	0.0986 95% Percentile Bootstrap UCL
Kolmogorov-Smirnov 5% Critical Value	0.0961 95% BCA Bootstrap UCL
Data follow Appr. Gamma Distribution at 5% Significance Level	95% Chebychev(Mean, Sd) UCL 97.5% Chebychev(Mean, Sd) UCL
Assuming Gamma Distribution	99% Chebychev(Mean, Sd) UCL
95% Approximate Gamma UCL	16.8
95% Adjusted Gamma UCL	16.8

Potential UCL to Use Use 95% Student's-t UCL 16.79

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Note: For highly negative-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

Pa234m

General Statistics		
Number of Valid Observations	65 Number of Distinct Observations	45
Number of Missing Values	21	
Raw Statistics	Log-transformed Statistics	
Minimum	0 Log Statistics Not Available	
Maximum	4.8	
Mean	1.631	
Median	1.4	
SD	0.905	
Std. Error of Mean	0.112	
Coefficient of Variation	0.555	
Skewness	0.835	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Lilliefors Test Statistic	0.135 Not Available	
Lilliefors Critical Value	0.11	
Data not Normal at 5% Significance Level		

Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	1.818 95% H-UCL	N/A

Assuming Normal Distribution	95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.818 95% Adjusted-CLT UCL (Chen 1995)	1.828
	95% Modified-t UCL (Johnson-1978)	1.82
Gamma Distribution Test	Data Distribution	
Gamma Statistics Not Available	Data do not follow a Discernable Distribution (0.05)	
Potential UCL to Use		
Use 95% Chebyshev (Mean, Sd) UCL	2.12 95% CLT UCL 95% Jackknife UCL 95% Standard Bootstrap UCL 95% Bootstrap-t UCL 95% Hall's Bootstrap UCL 95% Percentile Bootstrap UCL 95% BCA Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	1.816 1.818 1.81 1.822 1.842 1.827 1.83 2.12 2.332 2.747

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
 These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
 and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Pb212

General Statistics		
Number of Valid Observations	86 Number of Distinct Observations	66
Raw Statistics	Log-transformed Statistics	
Minimum	0.518 Minimum of Log Data	-0.658
Maximum	1.59 Maximum of Log Data	0.464
Mean	0.961 Mean of log Data	-0.0765
Median	0.965 SD of log Data	0.275
SD	0.257	
Std. Error of Mean	0.0277	
Coefficient of Variation	0.267	
Skewness	0.23	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Lilliefors Test Statistic	0.0877 Lilliefors Test Statistic	0.0692
Lilliefors Critical Value	0.0955 Lilliefors Critical Value	0.0955
Data appear Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	1.007 95% H-UCL	1.013
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	1.088
95% Adjusted-CLT UCL (Chen-1995)	1.007 97.5% Chebyshev (MVUE) UCL	1.143
95% Modified-t UCL (Johnson-1978)	1.007 99% Chebyshev (MVUE) UCL	1.251
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	13.39 Data appear Normal at 5% Significance Level	
Theta Star	0.0718	
MLE of Mean	0.961	
MLE of Standard Deviation	0.263	
nu star	2302	
Approximate Chi Square Value (.05)	2192 Nonparametric Statistics	
Adjusted Level of Significance	0.0472 95% CLT UCL	1.006
Adjusted Chi Square Value	2190 95% Jackknife UCL	1.007
	95% Standard Bootstrap UCL	1.007
Anderson-Darling Test Statistic	0.528 95% Bootstrap-t UCL	1.009
Anderson-Darling 5% Critical Value	0.751 95% Hall's Bootstrap UCL	1.007
Kolmogorov-Smirnov Test Statistic	0.0795 95% Percentile Bootstrap UCL	1.006
Kolmogorov-Smirnov 5% Critical Value	0.0963 95% BCA Bootstrap UCL	1.005
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	1.081 1.134 1.236
Assuming Gamma Distribution		
95% Approximate Gamma UCL	1.009	
95% Adjusted Gamma UCL	1.01	
Potential UCL to Use	Use 95% Student's-t UCL	1.007

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
 These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
 and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Pb214

General Statistics		
Number of Valid Observations	86 Number of Distinct Observations	66
Raw Statistics	Log-transformed Statistics	
Minimum	0.524 Minimum of Log Data	-0.646
Maximum	2.99 Maximum of Log Data	1.095
Mean	1.164 Mean of log Data	0.102
Median	1.045 SD of log Data	0.313
SD	0.392	
Std. Error of Mean	0.0422	
Coefficient of Variation	0.336	
Skewness	1.496	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Lilliefors Test Statistic	0.153 Lilliefors Test Statistic	0.103
Lilliefors Critical Value	0.0955 Lilliefors Critical Value	0.0955
Data not Normal at 5% Significance Level	Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		
95% Student's-t UCL	1.235	95% H-UCL
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL
95% Adjusted-CLT UCL (Chen-1995)	1.241	97.5% Chebyshev (MVUE) UCL
95% Modified-t UCL (Johnson-1978)	1.236	99% Chebyshev (MVUE) UCL
Assuming Lognormal Distribution		
k star (bias corrected)	9.861	Data do not follow a Discernable Distribution (0.05)
Theta Star	0.118	
MLE of Mean	1.164	
MLE of Standard Deviation	0.371	
nu star	1696	
Approximate Chi Square Value (.05)	1602	Nonparametric Statistics
Adjusted Level of Significance	0.0472	95% CLT UCL
Adjusted Chi Square Value	1600	95% Jackknife UCL
		95% Standard Bootstrap UCL
Anderson-Darling Test Statistic	0.795	95% Bootstrap-t UCL
Anderson-Darling 5% Critical Value	0.751	95% Hall's Bootstrap UCL
Kolmogorov-Smirnov Test Statistic	0.122	95% Percentile Bootstrap UCL
Kolmogorov-Smirnov 5% Critical Value	0.0963	95% BCA Bootstrap UCL
Data not Gamma Distributed at 5% Significance Level		1.24
Assuming Gamma Distribution		
95% Approximate Gamma UCL	1.233	95% Chebyshev(Mean, Sd) UCL
95% Adjusted Gamma UCL	1.234	97.5% Chebyshev(Mean, Sd) UCL
		99% Chebyshev(Mean, Sd) UCL
Potential UCL to Use		Use 95% Student's-t UCL or 95% Modified-t UCL
		1.235 1.236

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Ra223

General Statistics		
Number of Valid Observations	72	Number of Distinct Observations
Number of Missing Values	14	60
Raw Statistics		
Minimum	0.125	Log-transformed Statistics
Maximum	0.449	Minimum of Log Data
Mean	0.26	-2.079
Median	0.252	Maximum of Log Data
SD	0.0705	-0.801
Std. Error of Mean	0.00831	0.26
Coefficient of Variation	0.271	0.384
Skewness	0.484	0.274
Relevant UCL Statistics		
Normal Distribution Test		
Lilliefors Test Statistic	0.0994	Lognormal Distribution Test
Lilliefors Critical Value	0.104	Lilliefors Test Statistic
Data appear Normal at 5% Significance Level		0.0526
		0.104
Assuming Normal Distribution		
95% Student's-t UCL	0.274	Assuming Lognormal Distribution
95% UCLs (Adjusted for Skewness)		95% H-UCL
95% Adjusted-CLT UCL (Chen-1995)	0.274	95% Chebyshev (MVUE) UCL
95% Modified-t UCL (Johnson-1978)	0.274	97.5% Chebyshev (MVUE) UCL
		0.313
		0.345
Gamma Distribution Test		
k star (bias corrected)	13.28	Data appear Normal at 5% Significance Level
Theta Star	0.0196	
MLE of Mean	0.26	
MLE of Standard Deviation	0.0713	
nu star	1913	
Approximate Chi Square Value (.05)	1812	Nonparametric Statistics
Adjusted Level of Significance	0.0467	95% CLT UCL
Adjusted Chi Square Value	1810	95% Jackknife UCL
		95% Standard Bootstrap UCL
Anderson-Darling Test Statistic	0.175	95% Bootstrap-t UCL
Anderson-Darling 5% Critical Value	0.75	95% Hall's Bootstrap UCL
Kolmogorov-Smirnov Test Statistic	0.07	95% Percentile Bootstrap UCL
Kolmogorov-Smirnov 5% Critical Value	0.105	95% BCA Bootstrap UCL
Data appear Gamma Distributed at 5% Significance Level		0.274
		0.273
		0.296
Assuming Gamma Distribution		
95% Approximate Gamma UCL	0.274	95% Chebyshev(Mean, Sd) UCL
95% Adjusted Gamma UCL	0.275	97.5% Chebyshev(Mean, Sd) UCL
		0.312
		0.343
Potential UCL to Use		Use 95% Student's-t UCL
		0.274

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Ra226

General Statistics		
Number of Valid Observations	86	Number of Distinct Observations
		69
Raw Statistics		
Minimum	0	Log-transformed Statistics
Maximum	6.04	Log Statistics Not Available
Mean	2.037	
Median	1.825	
SD	0.881	
Std. Error of Mean	0.095	
Coefficient of Variation	0.432	
Skewness	1.399	
Relevant UCL Statistics		

Normal Distribution Test	Lognormal Distribution Test		
Lilliefors Test Statistic	0.141 Not Available		
Lilliefors Critical Value	0.0955		
Data not Normal at 5% Significance Level			
Assuming Normal Distribution	Assuming Lognormal Distribution		
95% Student's-t UCL	2.195	95% H-UCL	N/A
Assuming Normal Distribution	95% UCLs (Adjusted for Skewness)		
95% Student's-t UCL	2.195	95% Adjusted-CLT UCL (Chen 1995)	2.209
	95% Modified-t UCL (Johnson-1978)		
Gamma Distribution Test	Data Distribution		
Gamma Statistics Not Available	Data do not follow a Discernable Distribution (0.05)		
Potential UCL to Use			
Use 95% Chebyshev (Mean, Sd) UCL	2.451	95% CLT UCL	2.193
		95% Jackknife UCL	2.195
		95% Standard Bootstrap UCL	2.19
		95% Bootstrap-t UCL	2.213
		95% Hall's Bootstrap UCL	2.217
		95% Percentile Bootstrap UCL	2.195
		95% BCA Bootstrap UCL	2.199
		95% Chebyshev(Mean, Sd) UCL	2.451
		97.5% Chebyshev(Mean, Sd) UCL	2.63
		99% Chebyshev(Mean, Sd) UCL	2.982

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Ra228

General Statistics			
Number of Valid Observations	86	Number of Distinct Observations	63
Raw Statistics	Log-transformed Statistics		
Minimum	0.498	Minimum of Log Data	-0.697
Maximum	1.58	Maximum of Log Data	0.457
Mean	0.983	Mean of log Data	-0.0507
Median	0.97	SD of log Data	0.263
SD	0.249		
Std. Error of Mean	0.0269		
Coefficient of Variation	0.253		
Skewness	0.147		
Relevant UCL Statistics			
Normal Distribution Test	Lognormal Distribution Test		
Lilliefors Test Statistic	0.0939	Lilliefors Test Statistic	0.0941
Lilliefors Critical Value	0.0955	Lilliefors Critical Value	0.0955
Data appear Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Level		
Assuming Normal Distribution	Assuming Lognormal Distribution		
95% Student's-t UCL	1.027	95% H-UCL	1.034
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1.107
95% Adjusted-CLT UCL (Chen-1995)	1.027	97.5% Chebyshev (MVUE) UCL	1.161
95% Modified-t UCL (Johnson-1978)	1.027	99% Chebyshev (MVUE) UCL	1.266
Gamma Distribution Test	Data Distribution		
k star (bias corrected)	14.7 Data appear Normal at 5% Significance Level		
Theta Star	0.0668		
MLE of Mean	0.983		
MLE of Standard Deviation	0.256		
nu star	2528		
Approximate Chi Square Value (.05)	2413	Nonparametric Statistics	
Adjusted Level of Significance	0.0472	95% CLT UCL	1.027
Adjusted Chi Square Value	2411	95% Jackknife UCL	1.027
		95% Standard Bootstrap UCL	1.025
Anderson-Darling Test Statistic	0.746	95% Bootstrap-t UCL	1.028
Anderson-Darling 5% Critical Value	0.751	95% Hall's Bootstrap UCL	1.026
Kolmogorov-Smirnov Test Statistic	0.0801	95% Percentile Bootstrap UCL	1.025
Kolmogorov-Smirnov 5% Critical Value	0.0962	95% BCA Bootstrap UCL	1.03
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.1
		97.5% Chebyshev(Mean, Sd) UCL	1.15
		99% Chebyshev(Mean, Sd) UCL	1.25
Assuming Gamma Distribution			
95% Approximate Gamma UCL	1.03		
95% Adjusted Gamma UCL	1.031		
Potential UCL to Use	Use 95% Student's-t UCL		1.027

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Th227

General Statistics			
Number of Valid Observations	62	Number of Distinct Observations	47
Number of Missing Values	24		
Raw Statistics	Log-transformed Statistics		
Minimum	-0.005	Log Statistics Not Available	
Maximum	0.32		
Mean	0.0925		
Median	0.081		
SD	0.0687		

Std. Error of Mean	0.00873	
Coefficient of Variation	0.743	
Skewness	1.011	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Lilliefors Test Statistic	0.118 Not Available	
Lilliefors Critical Value	0.113	
Data not Normal at 5% Significance Level		
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	0.107 95% H-UCL	N/A
Assuming Normal Distribution	95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.107 95% Adjusted-CLT UCL (Chen 1995)	0.108
	95% Modified-t UCL (Johnson-1978)	0.107
Gamma Distribution Test	Data Distribution	
Gamma Statistics Not Available	Data do not follow a Discernable Distribution (0.05)	
Potential UCL to Use		
Use 95% Chebyshev (Mean, Sd) UCL	0.131 95% CLT UCL 95% Jackknife UCL 95% Standard Bootstrap UCL 95% Bootstrap-t UCL 95% Hall's Bootstrap UCL 95% Percentile Bootstrap UCL 95% BCA Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.107 0.107 0.107 0.109 0.109 0.106 0.108 0.131 0.147 0.179

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Th228

General Statistics		
Number of Valid Observations	56	Number of Distinct Observations
Number of Missing Values	30	47
Raw Statistics		Log-transformed Statistics
Minimum	0.48	Minimum of Log Data
Maximum	2.63	Maximum of Log Data
Mean	1.099	Mean of log Data
Median	1.01	SD of log Data
SD	0.408	0.345
Std. Error of Mean	0.0546	
Coefficient of Variation	0.372	
Skewness	1.392	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Lilliefors Test Statistic	0.153 Lilliefors Test Statistic	0.0826
Lilliefors Critical Value	0.118 Lilliefors Critical Value	0.118
Data not Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	1.19 95% H-UCL	1.188
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	1.319
95% Adjusted-CLT UCL (Chen-1995)	1.191 97.5% Chebyshev (MVUE) UCL	1.416
95% Modified-t UCL (Johnson-1978)	1.192 99% Chebyshev (MVUE) UCL	1.605
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	8.118 Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.135	
MLE of Mean	1.099	
MLE of Standard Deviation	0.386	
nu star	909.3	
Approximate Chi Square Value (.05)	840.3 Nonparametric Statistics	
Adjusted Level of Significance	0.0457 95% CLT UCL	1.188
Adjusted Chi Square Value	838.5 95% Jackknife UCL 95% Standard Bootstrap UCL	1.187
Anderson-Darling Test Statistic	0.621 95% Bootstrap-t UCL	1.19
Anderson-Darling 5% Critical Value	0.751 95% Hall's Bootstrap UCL	1.202
Kolmogorov-Smirnov Test Statistic	0.108 95% Percentile Bootstrap UCL	1.19
Kolmogorov-Smirnov 5% Critical Value	0.119 95% BCA Bootstrap UCL	1.193
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	1.336 1.439 1.641
Assuming Gamma Distribution		
95% Approximate Gamma UCL	1.189	
95% Adjusted Gamma UCL	1.191	
Potential UCL to Use	Use 95% Approximate Gamma UCL	1.189

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Th230

General Statistics		
Number of Valid Observations	56	Number of Distinct Observations
Number of Missing Values	30	50

Raw Statistics	Log-transformed Statistics	
Minimum	0.56	Minimum of Log Data
Maximum	3.71	Maximum of Log Data
Mean	1.423	Mean of log Data
Median	1.26	SD of log Data
SD	0.647	
Std. Error of Mean	0.0864	
Coefficient of Variation	0.454	
Skewness	1.661	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Lilliefors Test Statistic	0.141	Lilliefors Test Statistic
Lilliefors Critical Value	0.118	Lilliefors Critical Value
Data not Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	1.568	95% H-UCL
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL
95% Adjusted-CLT UCL (Chen-1995)	1.586	97.5% Chebyshev (MVUE) UCL
95% Modified-t UCL (Johnson-1978)	1.571	99% Chebyshev (MVUE) UCL
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	5.777	Data Follow Appr. Gamma Distribution at 5% Significance Level
Theta Star	0.246	
MLE of Mean	1.423	
MLE of Standard Deviation	0.592	
nu star	647.1	
Approximate Chi Square Value (.05)	589.1	Nonparametric Statistics
Adjusted Level of Significance	0.0457	95% CLT UCL
Adjusted Chi Square Value	587.6	95% Jackknife UCL
		95% Standard Bootstrap UCL
Anderson-Darling Test Statistic	0.792	95% Bootstrap-UCL
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL
Kolmogorov-Smirnov Test Statistic	0.102	95% Percentile Bootstrap UCL
Kolmogorov-Smirnov 5% Critical Value	0.119	95% BCA Bootstrap UCL
Data follow Appr. Gamma Distribution at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	1.8
	97.5% Chebyshev(Mean, Sd) UCL	1.963
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	2.283
95% Approximate Gamma UCL	1.564	
95% Adjusted Gamma UCL	1.567	
Potential UCL to Use	Use 95% Approximate Gamma UCL	1.564

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Th232

General Statistics		
Number of Valid Observations	56	Number of Distinct Observations
Number of Missing Values	30	46
Raw Statistics	Log-transformed Statistics	
Minimum	0.46	Minimum of Log Data
Maximum	1.76	Maximum of Log Data
Mean	0.952	Mean of log Data
Median	0.895	SD of log Data
SD	0.295	
Std. Error of Mean	0.0395	
Coefficient of Variation	0.31	
Skewness	0.844	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Lilliefors Test Statistic	0.127	Lilliefors Test Statistic
Lilliefors Critical Value	0.118	Lilliefors Critical Value
Data not Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	1.018	95% H-UCL
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL
95% Adjusted-CLT UCL (Chen-1995)	1.021	97.5% Chebyshev (MVUE) UCL
95% Modified-t UCL (Johnson-1978)	1.018	99% Chebyshev (MVUE) UCL
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	10.75	Data appear Gamma Distributed at 5% Significance Level
Theta Star	0.0886	
MLE of Mean	0.952	
MLE of Standard Deviation	0.29	
nu star	1204	
Approximate Chi Square Value (.05)	1124	Nonparametric Statistics
Adjusted Level of Significance	0.0457	95% CLT UCL
Adjusted Chi Square Value	1122	95% Jackknife UCL
		95% Standard Bootstrap UCL
Anderson-Darling Test Statistic	0.531	95% Bootstrap-UCL
Anderson-Darling 5% Critical Value	0.75	95% Hall's Bootstrap UCL
Kolmogorov-Smirnov Test Statistic	0.0913	95% Percentile Bootstrap UCL
Kolmogorov-Smirnov 5% Critical Value	0.119	95% BCA Bootstrap UCL
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	1.124
	97.5% Chebyshev(Mean, Sd) UCL	1.198
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	1.344
95% Approximate Gamma UCL	1.019	
95% Adjusted Gamma UCL	1.021	
Potential UCL to Use	Use 95% Approximate Gamma UCL	1.019

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Th234

General Statistics		
Number of Valid Observations	72	Number of Distinct Observations
Number of Missing Values	14	51
Raw Statistics		Log-transformed Statistics
Minimum	0	Log Statistics Not Available
Maximum	4.24	
Mean	0.928	
Median	0.67	
SD	0.682	
Std. Error of Mean	0.0804	
Coefficient of Variation	0.735	
Skewness	2.309	
Relevant UCL Statistics		
Normal Distribution Test		Lognormal Distribution Test
Lilliefors Test Statistic	0.214	Not Available
Lilliefors Critical Value	0.104	
Data not Normal at 5% Significance Level		
Assuming Normal Distribution		Assuming Lognormal Distribution
95% Student's-t UCL	1.062	95% H-UCL
Assuming Normal Distribution		95% UCLs (Adjusted for Skewness)
95% Student's-t UCL	1.062	95% Adjusted-CLT UCL (Chen 1995)
		95% Modified-t UCL (Johnson-1978)
Gamma Distribution Test		Data Distribution
Gamma Statistics Not Available		Data do not follow a Discernable Distribution (0.05)
Potential UCL to Use		
Use 95% Chebyshev (Mean, Sd) UCL	1.278	95% CLT UCL
		95% Jackknife UCL
		95% Standard Bootstrap UCL
		95% Bootstrap-t UCL
		95% Hall's Bootstrap UCL
		95% Percentile Bootstrap UCL
		95% BCA Bootstrap UCL
		95% Chebyshev(Mean, Sd) UCL
		97.5% Chebyshev(Mean, Sd) UCL
		99% Chebyshev(Mean, Sd) UCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

T1208

General Statistics		
Number of Valid Observations	86	Number of Distinct Observations
		78
Raw Statistics		Log-transformed Statistics
Minimum	0.158	Minimum of Log Data
Maximum	0.475	Maximum of Log Data
Mean	0.305	Mean of Log Data
Median	0.303	SD of Log Data
SD	0.0812	0.278
Std. Error of Mean	0.00875	
Coefficient of Variation	0.266	
Skewness	0.111	
Relevant UCL Statistics		
Normal Distribution Test		Lognormal Distribution Test
Lilliefors Test Statistic	0.0828	Lilliefors Test Statistic
Lilliefors Critical Value	0.0955	Lilliefors Critical Value
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level
Assuming Normal Distribution		Assuming Lognormal Distribution
95% Student's-t UCL	0.32	95% H-UCL
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL
95% Adjusted-CLT UCL (Chen-1995)	0.32	97.5% Chebyshev (MVUE) UCL
95% Modified-t UCL (Johnson-1978)	0.32	99% Chebyshev (MVUE) UCL
Gamma Distribution Test		Data Distribution
k star (bias corrected)	13.26	Data appear Normal at 5% Significance Level
Theta Star	0.023	
MLE of Mean	0.305	
MLE of Standard Deviation	0.0839	
nu star	2280	
Approximate Chi Square Value (.05)	2170	Nonparametric Statistics
Adjusted Level of Significance	0.0472	95% CLT UCL
Adjusted Chi Square Value	0.2168	95% Jackknife UCL
		95% Standard Bootstrap UCL
		95% Bootstrap-t UCL
Anderson-Darling Test Statistic	0.648	95% Hall's Bootstrap UCL
Anderson-Darling 5% Critical Value	0.751	95% Percentile Bootstrap UCL
Kolmogorov-Smirnov Test Statistic	0.0741	95% BCA Bootstrap UCL
Kolmogorov-Smirnov 5% Critical Value	0.0963	95% Chebyshev(Mean, Sd) UCL
Data appear Gamma Distributed at 5% Significance Level		97.5% Chebyshev(Mean, Sd) UCL
		99% Chebyshev(Mean, Sd) UCL
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL
95% Approximate Gamma UCL	0.321	
95% Adjusted Gamma UCL	0.321	
Potential UCL to Use		Use 95% Student's-t UCL
		0.32

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

U234

General Statistics		
Number of Valid Observations	56	Number of Distinct Observations
Number of Missing Values	30	51
Raw Statistics	Log-transformed Statistics	
Minimum	0.42	Minimum of Log Data
Maximum	7.17	Maximum of Log Data
Mean	1.329	Mean of log Data
Median	1.08	SD of log Data
SD	1.028	
Std. Error of Mean	0.137	
Coefficient of Variation	0.773	
Skewness	3.756	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Lilliefors Test Statistic	0.209	Lilliefors Test Statistic
Lilliefors Critical Value	0.118	Lilliefors Critical Value
Data not Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	1.559	95% H-UCL
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL
95% Adjusted-CLT UCL (Chen-1995)	1.629	97.5% Chebyshev (MVUE) UCL
95% Modified-t UCL (Johnson-1978)	1.571	99% Chebyshev (MVUE) UCL
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	2.878	Data Follow Appr. Gamma Distribution at 5% Significance Level
Theta Star	0.462	
MLE of Mean	1.329	
MLE of Standard Deviation	0.784	
nu star	322.4	
Approximate Chi Square Value (.05)	281.8	Nonparametric Statistics
Adjusted Level of Significance	0.0457	95% CLT UCL
Adjusted Chi Square Value	280.8	95% Jackknife UCL
		95% Standard Bootstrap UCL
Anderson-Darling Test Statistic	0.974	95% Bootstrap-t UCL
Anderson-Darling 5% Critical Value	0.757	95% Hall's Bootstrap UCL
Kolmogorov-Smirnov Test Statistic	0.113	95% Percentile Bootstrap UCL
Kolmogorov-Smirnov 5% Critical Value	0.12	95% BCA Bootstrap UCL
Data follow Appr. Gamma Distribution at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	1.928
	97.5% Chebyshev(Mean, Sd) UCL	2.187
	99% Chebyshev(Mean, Sd) UCL	2.697
Assuming Gamma Distribution		
95% Approximate Gamma UCL	1.521	
95% Adjusted Gamma UCL	1.526	
Potential UCL to Use	Use 95% Approximate Gamma UCL	

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

U235

General Statistics		
Number of Valid Observations	85	Number of Distinct Observations
Number of Missing Values	1	67
Raw Statistics	Log-transformed Statistics	
Minimum	0.009	Minimum of Log Data
Maximum	0.37	Maximum of Log Data
Mean	0.104	Mean of log Data
Median	0.099	SD of log Data
SD	0.0635	
Std. Error of Mean	0.00688	
Coefficient of Variation	0.608	
Skewness	1.903	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Lilliefors Test Statistic	0.167	Lilliefors Test Statistic
Lilliefors Critical Value	0.0961	Lilliefors Critical Value
Data not Normal at 5% Significance Level	Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	0.116	95% H-UCL
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL
95% Adjusted-CLT UCL (Chen-1995)	0.117	97.5% Chebyshev (MVUE) UCL
95% Modified-t UCL (Johnson-1978)	0.116	99% Chebyshev (MVUE) UCL
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	2.925	Data do not follow a Discernable Distribution (0.05)
Theta Star	0.0357	
MLE of Mean	0.104	
MLE of Standard Deviation	0.061	
nu star	497.2	
Approximate Chi Square Value (.05)	446.5	Nonparametric Statistics
Adjusted Level of Significance	0.0472	95% CLT UCL
Adjusted Chi Square Value	445.7	95% Jackknife UCL
		95% Standard Bootstrap UCL
Anderson-Darling Test Statistic	0.969	95% Bootstrap-t UCL
Anderson-Darling 5% Critical Value	0.759	95% Hall's Bootstrap UCL
Kolmogorov-Smirnov Test Statistic	0.102	95% Percentile Bootstrap UCL
Kolmogorov-Smirnov 5% Critical Value	0.0977	95% BCA Bootstrap UCL
Data not Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	0.134
	97.5% Chebyshev(Mean, Sd) UCL	0.147
	99% Chebyshev(Mean, Sd) UCL	0.173
Assuming Gamma Distribution		
95% Approximate Gamma UCL	0.116	
95% Adjusted Gamma UCL	0.116	
Potential UCL to Use	Use 95% Chebyshev (Mean, Sd) UCL	

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

U235

General Statistics		
Number of Valid Observations	50 Number of Distinct Observations	39
Number of Missing Values	36	
Raw Statistics		
Minimum	0.026 Minimum of Log Data	-3.65
Maximum	0.244 Maximum of Log Data	-1.411
Mean	0.127 Mean of log Data	-2.131
Median	0.124 SD of log Data	0.384
SD	0.0432	
Std. Error of Mean	0.00611	
Coefficient of Variation	0.342	
Skewness	0.496	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.975 Shapiro Wilk Test Statistic	0.938
Shapiro Wilk Critical Value	0.947 Shapiro Wilk Critical Value	0.947
Data appear Normal at 5% Significance Level	Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		
95% Student's-t UCL	0.137 95% H-UCL	0.141
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	0.159
95% Adjusted-CLT UCL (Chen-1995)	0.137 97.5% Chebyshev (MVUE) UCL	0.172
95% Modified-t UCL (Johnson-1978)	0.137 99% Chebyshev (MVUE) UCL	0.199
Gamma Distribution Test		
k star (bias corrected)	7.504 Data appear Normal at 5% Significance Level	
Theta Star	0.0169	
MLE of Mean	0.127	
MLE of Standard Deviation	0.0462	
nu star	750.4	
Approximate Chi Square Value (.05)	687.8 Nonparametric Statistics	
Adjusted Level of Significance	0.0452 95% CLT UCL	0.137
Adjusted Chi Square Value	686.1 95% Jackknife UCL	0.137
	95% Standard Bootstrap UCL	0.136
Anderson-Darling Test Statistic	0.346 95% Bootstrap-t UCL	0.138
Anderson-Darling 5% Critical Value	0.751 95% Hall's Bootstrap UCL	0.138
Kolmogorov-Smirnov Test Statistic	0.0909 95% Percentile Bootstrap UCL	0.137
Kolmogorov-Smirnov 5% Critical Value	0.125 95% BCA Bootstrap UCL	0.137
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.153 0.165
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	0.187
95% Approximate Gamma UCL	0.138	
95% Adjusted Gamma UCL	0.138	
Potential UCL to Use	Use 95% Student's-t UCL	0.137

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

U238

General Statistics		
Number of Valid Observations	56 Number of Distinct Observations	52
Number of Missing Values	30	
Raw Statistics		
Minimum	0.47 Minimum of Log Data	-0.755
Maximum	6.42 Maximum of Log Data	1.859
Mean	1.369 Mean of log Data	0.167
Median	1.095 SD of log Data	0.514
SD	0.932	
Std. Error of Mean	0.125	
Coefficient of Variation	0.681	
Skewness	3.261	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Lilliefors Test Statistic	0.168 Lilliefors Test Statistic	0.0767
Lilliefors Critical Value	0.118 Lilliefors Critical Value	0.118
Data not Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		
95% Student's-t UCL	1.578 95% H-UCL	1.538
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	1.77
95% Adjusted-CLT UCL (Chen-1995)	1.632 97.5% Chebyshev (MVUE) UCL	1.954
95% Modified-t UCL (Johnson-1978)	1.587 99% Chebyshev (MVUE) UCL	2.315
Gamma Distribution Test		
k star (bias corrected)	3.377 Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	0.406	
MLE of Mean	1.369	
MLE of Standard Deviation	0.745	
nu star	378.2	
Approximate Chi Square Value (.05)	334.1 Nonparametric Statistics	
Adjusted Level of Significance	0.0457 95% CLT UCL	1.574
Adjusted Chi Square Value	333 95% Jackknife UCL 95% Standard Bootstrap UCL	1.578 1.568
Anderson-Darling Test Statistic	1.016 95% Bootstrap-t UCL	1.676
Anderson-Darling 5% Critical Value	0.755 95% Hall's Bootstrap UCL	1.895
Kolmogorov-Smirnov Test Statistic	0.11 95% Percentile Bootstrap UCL	1.572
Kolmogorov-Smirnov 5% Critical Value	0.12 95% BCA Bootstrap UCL	1.616
Data follow Appr. Gamma Distribution at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	1.912 2.147

Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	2.609
95% Approximate Gamma UCL	1.55	
95% Adjusted Gamma UCL	1.555	

Potential UCL to Use Use 95% Approximate Gamma UCL 1.55

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options

From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Arsenic

Background Data: Arsenic

Raw Statistics

	Site	Background
Number of Valid Observations	84	12
Number of Missing Values	2	0
Number of Distinct Observations	79	12
Minimum	0.016	4.25
Maximum	10.6	5.52
Mean	4.497	4.803
Median	4.335	4.68
SD	1.446	0.4
SE of Mean	0.158	0.115

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC \leq Mean/Median of Background

Site Rank Sum W-Stat	3943
WMW Test U-Stat	-1.457
WMW Critical Value (0.050)	1.645
P-Value	0.927

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site \leq Background

P-Value \geq alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options

From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Lead

Background Data: Lead

Raw Statistics

	Site	Background
Number of Valid Observations	84	12
Number of Missing Values	2	0
Number of Distinct Observations	74	11
Minimum	0.019	9.46
Maximum	27.7	14.2
Mean	12.75	11.13
Median	12.15	10.55
SD	5.337	1.559
SE of Mean	0.582	0.45

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC \leq Mean/Median of Background

Site Rank Sum W-Stat	4120
WMW Test U-Stat	0.499
WMW Critical Value (0.050)	1.645
P-Value	0.309

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options

From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Molybdenum

Background Data: Molybdenum

Raw Statistics

	Site	Background
Number of Valid Observations	84	12
Number of Missing Values	2	0
Number of Distinct Observations	77	11
Minimum	0.023	0.343
Maximum	1.74	0.623
Mean	0.719	0.407
Median	0.657	0.386
SD	0.288	0.0776
SE of Mean	0.0314	0.0224

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	4465
WMW Test U-Stat	4.321
WMW Critical Value (0.050)	1.645
P-Value	7.78E-06

Conclusion with Alpha = 0.05

Reject H0, Conclude Site > Background
P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options

From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Selenium

Background Data: Selenium

Raw Statistics

	Site	Background
Number of Valid Observations	46	12
Number of Missing Values	31	0
Number of Distinct Observations	45	12
Minimum	0.022	0.349
Maximum	2.2	2.03
Mean	0.615	0.555
Median	0.531	0.404
SD	0.367	0.472
SE of Mean	0.0541	0.136

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC \leq Mean/Median of Background

Site Rank Sum W-Stat	1435
WMW Test U-Stat	1.488
WMW Critical Value (0.050)	1.645
P-Value	0.0684

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options

From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Vanadium

Background Data: Vanadium

Raw Statistics

	Site	Background
Number of Valid Observations	46	12
Number of Missing Values	31	0
Number of Distinct Observations	40	12
Minimum	0.022	20.4
Maximum	38.9	36.5
Mean	23.95	27.55
Median	23.4	28.05
SD	7.383	4.472
SE of Mean	1.088	1.291

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	1260
WMW Test U-Stat	-1.881
WMW Critical Value (0.050)	1.645

P-Value 0.97

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options

From File Milan_Metals.wst

Full Precision OFF

Confidence Coefficient 95%

Substantial Difference 0

Selected Null Hypothesis Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)

Alternative Hypothesis Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Alpha

Background Data: Alpha

Raw Statistics

	Site	Background
Number of Valid Observations	86	12
Number of Distinct Observations	55	11
Minimum	0.8	2
Maximum	26.6	6.7
Mean	8.047	4.908
Median	7.85	5.7
SD	3.753	1.786
SE of Mean	0.405	0.515

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat 4543

WMW Test U-Stat 3.089

WMW Critical Value (0.050) 1.645

P-Value 0.00101

Conclusion with Alpha = 0.05

Reject H0, Conclude Site > Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options

From File Milan_Metals.wst

Full Precision OFF

Confidence Coefficient 95%

Substantial Difference 0

Selected Null Hypothesis Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)

Alternative Hypothesis Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Ba140

Background Data: Ba140

Raw Statistics

	Site	Background
Number of Valid Observations	86	12
Number of Distinct Observations	1	2
Minimum	0	0
Maximum	0	0.825
Mean	0	0.0688
Median	0	0
SD	0	0.238
SE of Mean	0	0.0688

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat 4214

WMW Test U-Stat -0.471

WMW Critical Value (0.050)	1.645
P-Value	0.681

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Beta

Background Data: Beta

Raw Statistics

	Site	Background
Number of Valid Observations	86	12
Number of Distinct Observations	69	11
Minimum	11	19.1
Maximum	42.7	27.6
Mean	25.93	24.16
Median	25.85	24.35
SD	4.966	2.514
SE of Mean	0.536	0.726

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	4376
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WMW Test U-Stat	1.279
WMW Critical Value (0.050)	1.645
P-Value	0.1

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Bi212

Background Data: Bi212

Raw Statistics

	Site	Background
Number of Valid Observations	86	12
Number of Distinct Observations	56	11
Minimum	0.48	0.87
Maximum	1.57	1.34
Mean	1.017	1.124
Median	1.045	1.115
SD	0.263	0.137
SE of Mean	0.0284	0.0396

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	4132
WMW Test U-Stat	-1.366
WMW Critical Value (0.050)	1.645
P-Value	0.914

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options

From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Bi214

Background Data: Bi214

Raw Statistics

	Site	Background
Number of Valid Observations	86	12
Number of Distinct Observations	62	11
Minimum	0.494	0.806
Maximum	2.79	1.05
Mean	1.087	0.904
Median	0.97	0.92
SD	0.368	0.0822
SE of Mean	0.0397	0.0237

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	4399
WMW Test U-Stat	1.534
WMW Critical Value (0.050)	1.645
P-Value	0.0626

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options

From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Co60

Background Data: Co60

Raw Statistics

	Site	Background
Number of Valid Observations	86	12
Number of Distinct Observations	1	1
Minimum	0	0
Maximum	0	0
Mean	0	0
Median	0	0
SD	0	0
SE of Mean	0	0

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	4257
WMW Test U-Stat	-0.00542
WMW Critical Value (0.050)	1.645
P-Value	0.502

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Cs137

Background Data: Cs137

Raw Statistics

	Site	Background
Number of Valid Observations	86	12
Number of Distinct Observations	62	9
Minimum	0.0113	0.053
Maximum	0.123	0.093
Mean	0.0628	0.0676
Median	0.061	0.0645
SD	0.0223	0.0107
SE of Mean	0.0024	0.00309

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	4163
WMW Test U-Stat	-1.03
WMW Critical Value (0.050)	1.645
P-Value	0.848

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: I131

Background Data: I131

Raw Statistics

	Site	Background
Number of Valid Observations	86	12
Number of Distinct Observations	1	1
Minimum	0	0
Maximum	0	0
Mean	0	0
Median	0	0
SD	0	0
SE of Mean	0	0

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	4257
WMW Test U-Stat	-0.00542
WMW Critical Value (0.050)	1.645
P-Value	0.502

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options

From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: K40

Background Data: K40

Raw Statistics

	Site	Background
Number of Valid Observations	86	12
Number of Distinct Observations	49	10
Minimum	12.7	16.6
Maximum	20.7	19.9
Mean	16.48	17.82
Median	16.75	17.65
SD	1.702	0.963
SE of Mean	0.184	0.278

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	4013
WMW Test U-Stat	-2.65
WMW Critical Value (0.050)	1.645
P-Value	0.996

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Pa234m

Background Data: Pa234m

Raw Statistics

	Site	Background
Number of Valid Observations	65	4
Number of Missing Values	21	4
Number of Distinct Observations	45	4
Minimum	0	0.9
Maximum	4.8	1.6
Mean	1.631	1.15
Median	1.4	1.05

SD	0.905	0.31
SE of Mean	0.112	0.155

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	2323
WMW Test U-Stat	1.22
WMW Critical Value (0.050)	1.645
P-Value	0.111

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Pb212

Background Data: Pb212

Raw Statistics

	Site	Background
Number of Valid Observations	86	12
Number of Distinct Observations	66	10
Minimum	0.518	0.89
Maximum	1.59	1.22
Mean	0.961	1.044
Median	0.965	1.04

SD	0.257	0.111
SE of Mean	0.0277	0.0322

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	4134
WMW Test U-Stat	-1.338
WMW Critical Value (0.050)	1.645
P-Value	0.91

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Pb214

Background Data: Pb214

Raw Statistics

	Site	Background
Number of Valid Observations	86	12
Number of Distinct Observations	66	9
Minimum	0.524	0.84
Maximum	2.99	1.1
Mean	1.164	0.97

Median	1.045	0.985
SD	0.392	0.0899
SE of Mean	0.0422	0.026

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	4398
WMW Test U-Stat	1.523
WMW Critical Value (0.050)	1.645
P-Value	0.0639

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Ra223

Background Data: Ra223

Raw Statistics

	Site	Background
Number of Valid Observations	72	9
Number of Missing Values	14	3
Number of Distinct Observations	60	9
Minimum	0.125	0.224

Maximum	0.449	0.344
Mean	0.26	0.272
Median	0.252	0.263
SD	0.0705	0.0383
SE of Mean	0.00831	0.0128

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	2894
WMW Test U-Stat	-0.879
WMW Critical Value (0.050)	1.645
P-Value	0.81

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Ra226

Background Data: Ra226

Raw Statistics

	Site	Background
Number of Valid Observations	86	12
Number of Distinct Observations	69	11
Minimum	0	1.29

Maximum	6.04	2
Mean	2.037	1.702
Median	1.825	1.74
SD	0.881	0.209
SE of Mean	0.095	0.0603

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	4364
WMW Test U-Stat	1.149
WMW Critical Value (0.050)	1.645
P-Value	0.125

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Ra228

Background Data: Ra228

Raw Statistics

	Site	Background
Number of Valid Observations	86	12
Number of Distinct Observations	63	11

Minimum	0.498	0.91
Maximum	1.58	1.26
Mean	0.983	1.08
Median	0.97	1.11
SD	0.249	0.11
SE of Mean	0.0269	0.0317

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	4119
WMW Test U-Stat	-1.501
WMW Critical Value (0.050)	1.645
P-Value	0.933

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Th227

Background Data: Th227

Raw Statistics

	Site	Background
Number of Valid Observations	62	5

Number of Missing Values	24	0
Number of Distinct Observations	47	5
Minimum	-0.005	0.061
Maximum	0.32	0.14
Mean	0.0925	0.0972
Median	0.081	0.1
SD	0.0687	0.0343
SE of Mean	0.00873	0.0153

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	2078
WMW Test U-Stat	-0.728
WMW Critical Value (0.050)	1.645
P-Value	0.767

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Th228

Background Data: Th228

Raw Statistics

Site	Background
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Number of Valid Observations	56	5
Number of Missing Values	30	0
Number of Distinct Observations	47	5
Minimum	0.48	0.98
Maximum	2.63	1.44
Mean	1.099	1.234
Median	1.01	1.21
SD	0.408	0.186
SE of Mean	0.0546	0.0833

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	1683
WMW Test U-Stat	-1.42
WMW Critical Value (0.050)	1.645
P-Value	0.922

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Th230

Background Data: Th230

Raw Statistics

	Site	Background
Number of Valid Observations	56	5
Number of Missing Values	30	0
Number of Distinct Observations	50	5
Minimum	0.56	0.7
Maximum	3.71	1.56
Mean	1.423	1.098
Median	1.26	1.05
SD	0.647	0.31
SE of Mean	0.0864	0.139

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	1782
WMW Test U-Stat	1.183
WMW Critical Value (0.050)	1.645
P-Value	0.118

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Th232

Background Data: Th232

Raw Statistics

	Site	Background
Number of Valid Observations	56	5
Number of Missing Values	30	0
Number of Distinct Observations	46	5
Minimum	0.46	0.87
Maximum	1.76	1.12
Mean	0.952	1.036
Median	0.895	1.09
SD	0.295	0.104
SE of Mean	0.0395	0.0463

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	1689
WMW Test U-Stat	-1.262
WMW Critical Value (0.050)	1.645
P-Value	0.897

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Th234

Background Data: Th234

Raw Statistics

	Site	Background
Number of Valid Observations	72	9
Number of Missing Values	14	3
Number of Distinct Observations	51	9
Minimum	0	0.32
Maximum	4.24	0.88
Mean	0.928	0.577
Median	0.67	0.56
SD	0.682	0.202
SE of Mean	0.0804	0.0672

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	3068
WMW Test U-Stat	1.736
WMW Critical Value (0.050)	1.645
P-Value	0.0413

Conclusion with Alpha = 0.05

Reject H0, Conclude Site > Background
P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options

From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: TI208

Background Data: TI208

Raw Statistics

	Site	Background
Number of Valid Observations	86	12
Number of Distinct Observations	78	12
Minimum	0.158	0.285
Maximum	0.475	0.394
Mean	0.305	0.339
Median	0.303	0.329
SD	0.0812	0.0348
SE of Mean	0.00875	0.01

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	4124
WMW Test U-Stat	-1.447
WMW Critical Value (0.050)	1.645
P-Value	0.926

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: U234

Background Data: U234

Raw Statistics

	Site	Background
Number of Valid Observations	56	5
Number of Missing Values	30	0
Number of Distinct Observations	51	5
Minimum	0.42	0.6
Maximum	7.17	1.22
Mean	1.329	0.91
Median	1.08	0.88
SD	1.028	0.243
SE of Mean	0.137	0.109

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC \leq Mean/Median of Background

Site Rank Sum W-Stat	1775
WMW Test U-Stat	1.012
WMW Critical Value (0.050)	1.645
P-Value	0.156

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site \leq Background

P-Value \geq alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options

From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: U235

Background Data: U235

Raw Statistics

	Site	Background
Number of Valid Observations	85	12
Number of Missing Values	1	0
Number of Distinct Observations	67	10
Minimum	0.009	0.059
Maximum	0.37	0.123
Mean	0.104	0.0981
Median	0.099	0.102
SD	0.0635	0.0185
SE of Mean	0.00688	0.00533

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	4143
WMW Test U-Stat	-0.252
WMW Critical Value (0.050)	1.645
P-Value	0.599

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options

From File	Milan_Metals.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: U238

Background Data: U238

Raw Statistics

	Site	Background
Number of Valid Observations	56	5
Number of Missing Values	30	0
Number of Distinct Observations	52	5
Minimum	0.47	0.73
Maximum	6.42	1.21
Mean	1.369	0.95
Median	1.095	0.89
SD	0.932	0.207
SE of Mean	0.125	0.0925

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	1779
WMW Test U-Stat	1.104
WMW Critical Value (0.050)	1.645
P-Value	0.135

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site <= Background

P-Value >= alpha (0.05)